CLAIMS

1. An optical semiconductor device comprising:

an active region; and

a p-doped cladding region disposed on one side of the active region;

wherein an electron-reflecting barrier is provided on the p-side of the active region for reflecting both Γ-electrons and X-electrons, the electron-reflecting barrier providing a greater potential barrier to Γ-electrons than the p-doped cladding region.

2. A device according to claim 1, wherein the electron-reflecting barrier comprises a first electron-reflecting layer for reflecting Γ-electrons and a second electron-reflecting layer for reflecting X-electrons.

3. A device according to claim 1, wherein at least one of the electron-reflecting layers is a strained layer.

4. A device according to claim 3, wherein one of the electron-reflecting layers is in a state of compressive strain and the other of the electron-reflecting layers is in a state of tensile strain.

5. A device according to claim 1, wherein the device is a light-emitting diode.

6. A device according to claim 1, wherein the device is a laser device.

7. A device according to claim 6, wherein the device is a separate confinement heterostructure laser device comprising an optical guiding region, the active region being disposed within the optical guiding region.

8. A device according to claim 2, wherein the layer for reflecting Γ-electrons is disposed between the optical guiding region and the layer for reflecting X-electrons.

9. A device according to claim 8, wherein the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the layer for reflecting Γ-electrons.

10. A device according to claim 2, wherein the layer for reflecting Γ-electrons is disposed between the layer for reflecting X-electrons and the p-doped cladding region.

11. A device according to claim 1, wherein the electron-reflecting barrier comprises a plurality of first electron-reflecting layers for reflecting Γ-electrons and a plurality of second electron-reflecting layers for reflecting X-electrons.

12. A device according to claim 11, wherein the electron-reflecting barrier is a superlattice structure.

13. A device according to claim 2, wherein the device is fabricated in the (Al,Ga,In)P system, the layer for reflecting Γ-electrons is made from a material selected from the group consisting of AlP and GaP, and the layer for reflecting X-electrons is made from InP.

14. A device according to claim 11, wherein the device is fabricated in the (Al,Ga,In)P system, each layer for reflecting Γ-electrons is made of a material selected from the group consisting of AlP and GaP, and each layer for reflecting X-electrons is made from InP.

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15. A device according to claim 9, wherein the layer for reflecting Γ-electrons is AlP and the optical guiding region is $(Al_{0.3}Ga_{0.7})_{0.52}In_{0.48}P$.

16. A device according to claim 13, wherein the thickness of each of the electron-reflecting layers is 16Å or less.

17. A device according to claim 1, wherein at least one of the electron-reflecting layers is p-doped.

18. A device according to claim 13, wherein the first electron-reflecting layer contains indium.

19. A device according to claim 7, wherein the electron-reflecting barrier is disposed between the optical guiding region and the p-doped cladding region.

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20. An optical semiconductor device comprising:

an optical guiding region;

an active region having at least one energy well, said active region being disposed in said optical guiding region; and

n-doped and p-doped cladding regions disposed on opposite sides of the optical guiding region;

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wherein an electron-reflecting layer for reflecting Γ-electrons is provided at the p-side of the active region; and

wherein the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the electron-reflecting layer.

~~21. A device according to claim 20, wherein the optical guiding region is formed of $(Al_{0.3}Ga_{0.7})_{0.52}In_{0.48}P$, and the electron-reflecting layer is formed of AlP.~~

~~22. A device according to claim 20, wherein the electron-reflecting layer is p-doped.~~

~~23. A device according to claim 20, wherein the electron-reflecting layer is disposed between the optical guiding region and the p-doped cladding region.~~

~~24. A device according to claim 20, wherein the device is a separate confinement heterostructure laser device.~~

25. (Added) An optical semiconductor device comprising:

an active region; and

a p-doped cladding region disposed on one side of the

active region,

wherein at least one electron-reflecting layer is provided on a p-side of the active region of reflecting Γ-electrons.

26. (Added) A device according to claim 25, wherein the at least one electron-reflecting layer is fabricated in a phoshorus system.

27. (Added) A device according to claim 26, wherein the at least one electron-reflecting layer is provided on the p-side of the active region for reflecting both Γ-electrons and X-electrons, the at least one electron-reflecting layer providing a greater potential barrier to Γ-electrons than the p-doped cladding region.

28. (Added) A device according to claim 26, wherein said active region has at least one potential well, and is disposed in an optical guiding region,

n-doped and p-doped cladding regions are disposed on opposite sides of the optical guiding region, and

the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the at least one electron-reflecting layer.

AMENDED SHEET